SD
A5
Rec
SD11
.A1
A42
No.222

BUCKEYE

. . . *an American wood*

Buckeye includes two commercially important species, yellow and Ohio buckeye. The wood of both buckeyes is low in strength, stiffness, and shock resistance; relatively soft and easily worked with hand tools; low in decay resistance; light in color; and practically odorless and tasteless. The principal use of buckeye is for furniture, crating, and musical instruments.

LIBRARY
APR 26 1973
ROCKY MOUNTAIN STATION

FS–222
January 1973
U.S. Department of Agriculture—Forest Service

For sale by the Superintendent of Documents,
U.S. Government Printing Office, Washington, D.C. 20402
Price 20 cents domestic postpaid or 10 cents GPO Bookstore
Stock Number 0101–00307

BUCKEYE

(*Aesculus octandra* Marsh.)
(*Aesculus glabra* Willd.)

John E. Duff[1]

DISTRIBUTION

Yellow buckeye is native to a restricted range (fig. 1) that extends southwest from southwestern Pennsylvania on both sides of the Ohio River to southeastern Illinois, including the southern third of Ohio, a small part of southern Indiana, and parts of Kentucky that border on the Ohio River. Most of the range extends into eastern Kentucky, almost all of West Virginia except the eastern areas, eastern Tennessee, western Virginia, western North Carolina, extreme western South Carolina, northern Georgia, and northern Alabama.

Ohio buckeye is native to a more extensive range (fig. 2) than yellow buckeye, and extends from extreme western Pennsylvania through most of Ohio, Indiana, Illinois, Missouri, and eastern Kansas. It ranges south into the eastern half of Oklahoma, the western third of Arkansas, and into central Texas. The range also extends into central Kentucky, Tennessee, and the extreme northern edge of Alabama.

Both species of buckeye attain their best growth in the rich, moist soils of river bottoms and stream banks. Yellow buckeye, although a riverbottom tree in the northern parts of its range, can be found growing well on high mountain slopes, and often attains its largest size on the northern slopes of the Appalachian and the Cumberland mountains. Likewise, the moist mountain coves on the southern slope also support sizeable buckeye stands. Ohio buckeye is sometimes found on drier sites, such as those supporting oak-hickory stands; however, it usually grows slowly here and seldom attains its maximum size. An open grown Ohio buckeye is shown on the cover of this leaflet.

[1] Associate wood scientist, Southeastern Forest Experiment Station, USDA Forest Service, stationed at Forestry Sciences Laboratory, Athens, Ga.

[2] A forest that grows under medium conditions of moisture (about 45 inches of annual rainfall).

NOTE: This publication supersedes "Buckeye," unnumbered, issued 1945.

Yellow buckeye, unlike Ohio buckeye, develops well in mixed mesophytic forests[2] and is often found together with yellow-poplar, white ash, and various oaks. Ohio buckeye grows in mixed stands of bur and chinkapin oak, white ash, hackberry, sugar maple, black cherry, honey locust, Kentucky coffeetree, American elm, and shagbark hickory in the southern region of Kentucky. In northern Indiana and Ohio, it is found in association with beech, sugar maple, and American basswood.

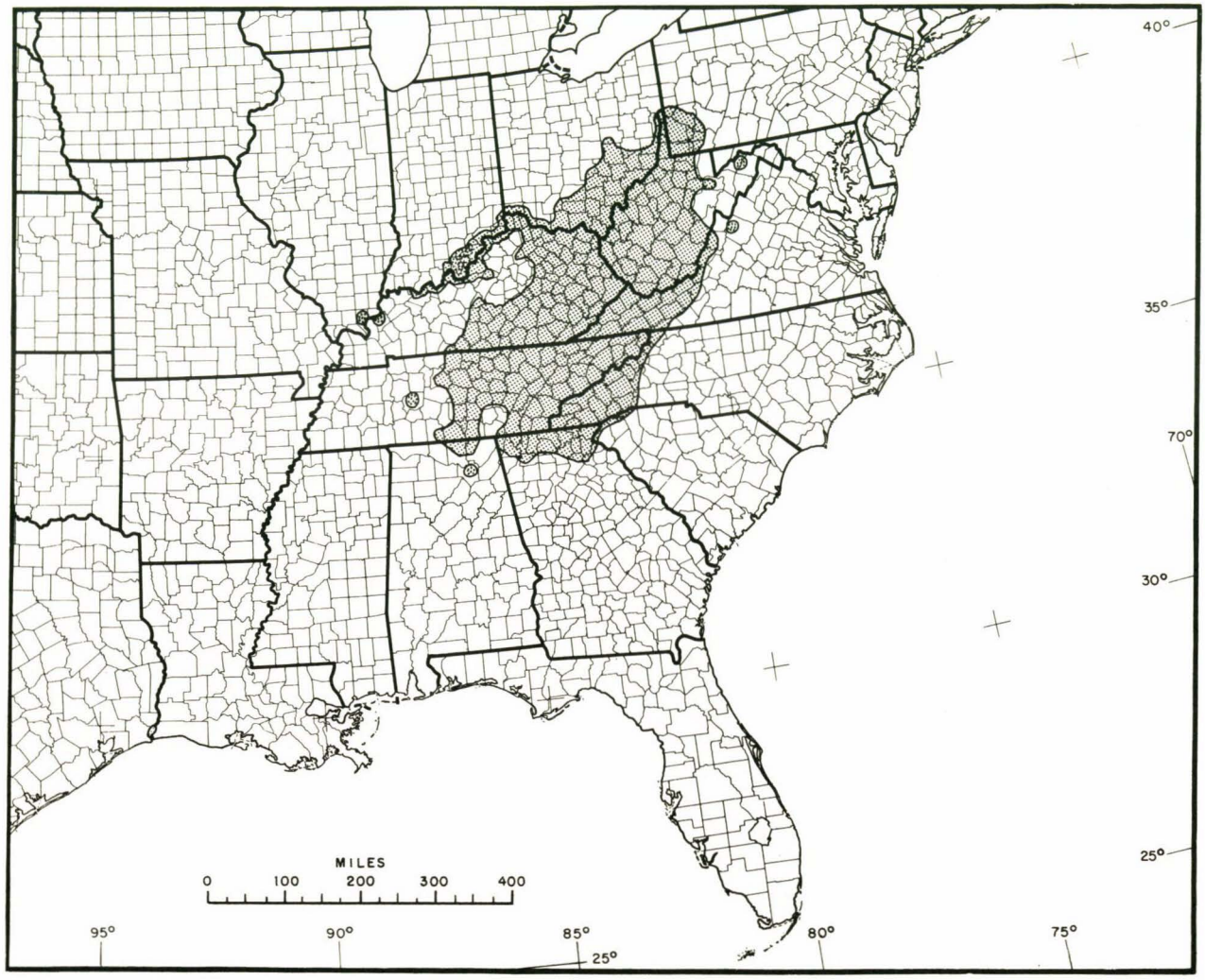
DESCRIPTION AND GROWTH

Both species of buckeye are among the first trees to leaf out and begin shoot growth in the spring. Under forest conditions, yellow buckeye usually attains a large size with a long, clean bole. The largest tree ever reported, located in the Great Smoky Mountains National Park, had a circumference of slightly under 16 feet and a height of 85 feet. Average trees reach 60 to 90 feet in height and 2 to 3 feet in diameter. Ohio buckeye is smaller than its yellow counterpart, ranging from 30 feet in height to (rarely) 70 feet; trees larger than 2 feet in diameter are unusual. In general, both species will reach sawtimber size in 60 to 80 years on favorable sites.

Yellow buckeye is considered a tolerant tree because it grows well in a mesophytic forest. The small number of yellow buckeye in naturally occurring stands is the result of limited seed distribution and the tree's inability to establish itself on all but the most favorable sites. Normally, seeds lose viability when exposed to drying conditions, thus limiting germination to only the moist sites.

Ohio buckeye is considered an intermediately tolerant tree, which means this species can survive in a forest understory. Like yellow buckeye, its seed requires moist soils for best germination.

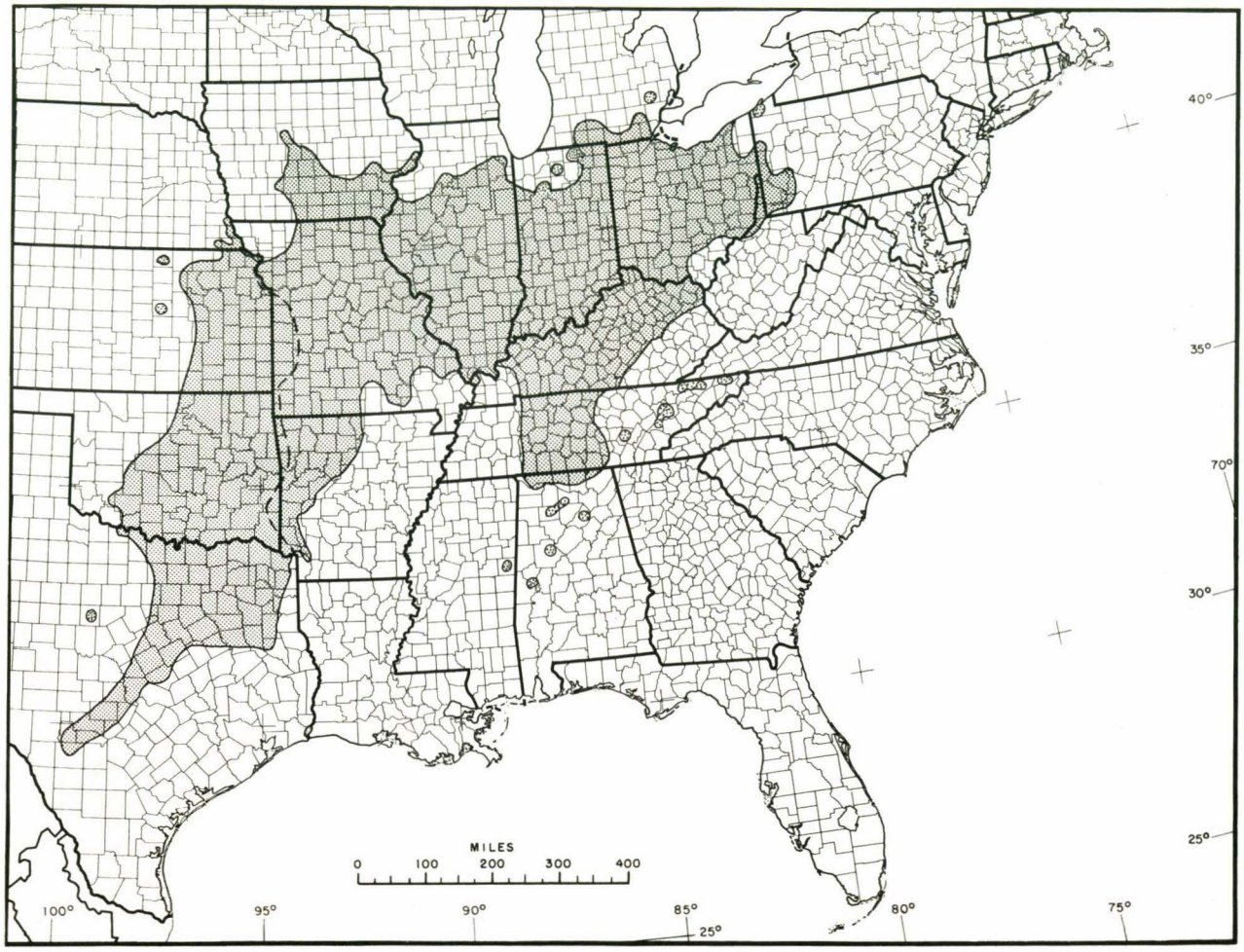
Germination for both species of buckeye occurs in early spring, after the seed has been lying on the ground



F-506570

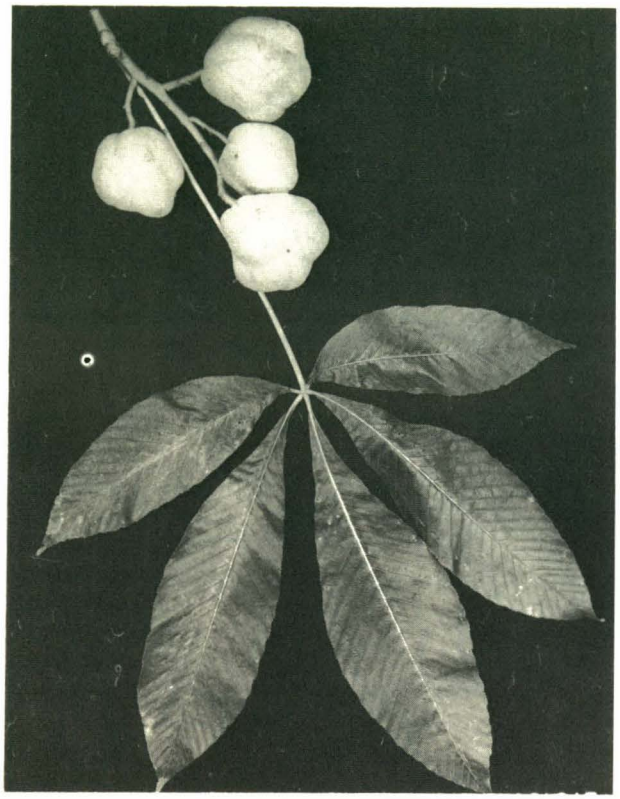
Figure 1.—Natural range of yellow buckeye, *Aesculus octandra* Marsh.

Cover: F-23910.



F-506569

Figure 2.—Natural range of Ohio buckeye, *Aesculus glabra* Willd.



F-491013

Figure 3.—Leaf and fruit of yellow buckeye.

F-491007

Figure 4.—Leaf and fruit of Ohio buckeye.

over winter. Best seedling development appears to occur in open areas along streambanks where isolated individuals can receive maximum light. Both yellow and Ohio buckeye seedlings develop a strong taproot during the first year, with most of the growth occurring early in subsequent growing seasons. Saplings of Ohio buckeye grow faster than most oaks, but slower than yellow-poplar. In the open it is characteristically branched and has a knotty trunk.

The leaves of yellow buckeye are palmately 5-foliate with nearly elliptical, servate leaflets (fig. 3). The The flowers are yellow, or yellow-white, on a single inflorescence, 4 to 5 inches long. A rather small number of the flowers in an inflorescence are perfect, resulting in only a few mature seed capsules around the periphery of an inflorescence. The mature fruit is a smooth, rounded, leathery capsule 2 to 3 inches long. Usually about half of the capsules are 1-seeded, although 2-, 3-, and 4-seeded capsules are not unusual. The capsules are dispersed by gravity in September and must remain in a moist environment to avoid loss of viability.

Ohio buckeye has similar characteristics, but differs in that (1) the leaves are slightly smaller; (2) bruised twigs or foliage give off a disagreeable odor; and (3) the fruit is somewhat spiny (fig. 4).

Both buckeyes have ashy gray bark that is densely furrowed and broken into large scaly flakes, (figs. 5 and 6). Old trees may have bark $\frac{3}{4}$-inch thick or more.

Both yellow and Ohio buckeye are relatively free from most diseases. The leaf blotch disease (*Guignardia aesculi*) attacks both buckeyes in the form of noticeably brown spots or blotches on the leaves that give the trees a scorched appearance. This disease does not permanently damage the trees, but it may slow growth. Rainy seasons are favorable for the development of this disease since spore activity is greatly enhanced by an abundance of moisture. Powdery mildew (*Uncinula flexuosa*) also attacks leaves of both species of buckeye. Both buckeyes are subject to wood-rotting fungi that attack heartwood of many deciduous trees but are usually free from such attack unless fire scars are present.

F-496656

Figure 5.—Bark of a yellow buckeye.

Both species produce large nuts that contain starch, but the nuts are not suitable as food because of the presence of a poisonous glucoside known as aesculin. However, American Indians used the nuts as food by roasting them to remove the tough outer shells and peeling, mashing, and leaching them in water for several days. This treatment apparently removed the aesculin poison.

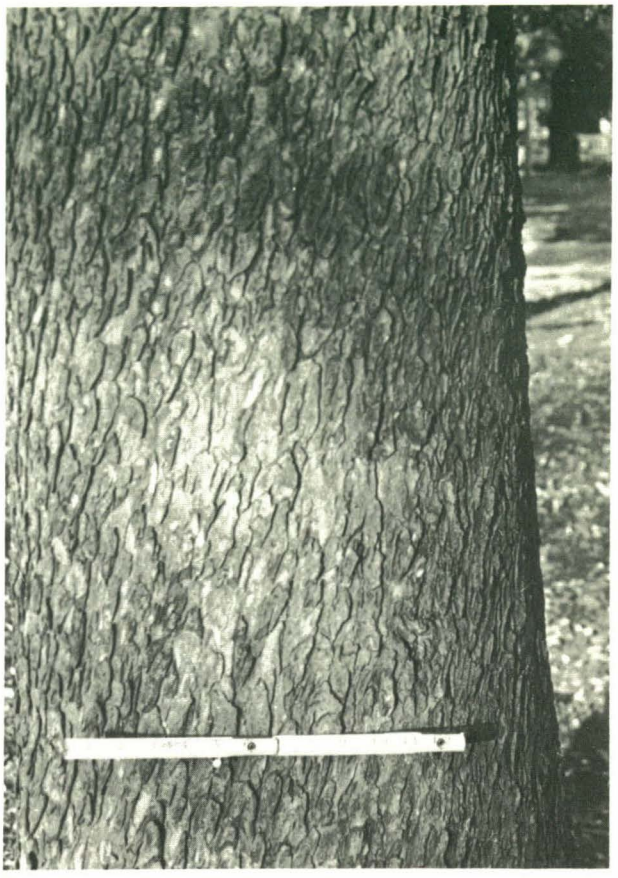
Because young shoots of the buckeyes are reportedly poisonous to livestock, buckeye has been exterminated in some areas.

COMMON NAMES

The name buckeye refers to several arborescent species of trees in the United States. However, only two species of buckeye are commercially important: yellow buckeye, often called sweet buckeye or big buckeye; and Ohio buckeye, often called fetid or stinking buckeye, or American horsechestnut.

SUPPLY

Rough estimates of the stands of both yellow and Ohio buckeye total around 75 million board feet, with the greater part of these stands located in Kentucky, West Virginia, North Carolina, and Tennessee.



F-496655

Figure 6.—Bark of an Ohio buckeye.

PRODUCTION

Since a peak annual production of yellow and Ohio buckeye, taken together, of almost 12 million board feet in 1911, production has fallen steadily over the years. Production in 1960 totaled 1,549,000 board feet.

CHARACTERISTICS AND PROPERTIES

The heartwood of yellow buckeye is yellowish or creamy white. The sapwood is white; usually the traces of yellow are absent. The sapwood merges into the heartwood and is not clearly defined. The annual rings are just visible as light-colored lines. The wood has a uniform, fine texture and is usually straight grained.

Yellow buckeye is a moderately lightweight wood (23 pounds per cubic foot at 12 percent moisture content) and exhibits low strength when used as a beam or column. The shock resistance of this wood is also low. The shrinking characteristics are rated as moderately high. Because of its low extraction content, this

wood has little resistance to decay fungi under favorable conditions.

Yellow buckeye turns moderately well on a lathe, and can be bored satisfactorily, but is rated low in mortising, shaping, and steam bending properties. The wood can be used satisfactorily for carving with hand tools.

Yellow buckeye can be pulped successfully by the soda, sulfate, and sulfite pulping processes. The resulting pulp is used in the manufacture of books, magazines, and low-cost printing papers.

Usually, all the properties and characteristics of yellow buckeye are essentially the same as for Ohio buckeye, since the wood of each species is almost identical for all practical purposes.

PRINCIPAL USES

Much of the 1.5 million board feet of the yellow and Ohio buckeye that was cut in 1960 went into lumber. The lumber was used in furniture, boxes, crating, trunks, signs, and flooring. High quality buckeye is used in scientific instrument cases, novelties, and woodenware. Buckeye has also found use in musical instruments and parts. The lack of odor and taste, its white color, and light weight account for its use to a limited extent in food containers. The wood is suitable for drawing boards, plaques, and carvings. Because of the wood's similarity to yellow-poplar, magnolia, and basswood, the species are sometimes used interchangeably. A small amount of buckeye is converted into veneer and plywood.

REFERENCES

Brown, H. P., Panshin, A. J., and Forsaith, C. C.
1949. Textbook of wood technology. McGraw-Hill Book Co., Inc. Vol. 1, 652 p., illus.

Carmean, W. H.
1958. Silvical characteristics of yellow buckeye. U.S. Dep. Agr., Central States Exp. Sta. Misc. Release 29, 16 p.

Little, Elbert L., Jr.
1953. Checklist of native and naturalized trees of the United States (including Alaska). U.S. Dep. Agr., Agr. Handb. 41, 472 p., illus.

Merz, R. W.
1957. Silvical characteristics of Ohio buckeye. U.S. Dep. Agr., Central States Exp. Sta. Misc. Release 16, 12 p.

U.S. Department of Agriculture
1949. Trees: the yearbook of agriculture, 944 p.

U.S. Forest Products Laboratory
1955. Wood handbook. U.S. Dep. Agr., Agr. Handb. 72, 528 p., illus.

U.S. Forest Service
1958. Timber resources for America's future. U.S. Dep. Agr. Forest Resour. Rep. 14, 713 p., illus.
1965. Silvics of forest trees of the United States. U.S. Dep. Agr., Agr. Handb. 271, 762 p., illus.
1965. Wood used in manufacturing industries. U.S. Dep. Agr. Stat. Bull. 353, 121 p.

Wangaard, F. F.
1950. The mechanical properties of wood. John Wiley & Sons, Inc., New York, N.Y. 377 p.

U.S. GOVERNMENT PRINTING OFFICE:1973—O-489-400